DOCUMENT RESUME

ED 352 634 CS 011 132

AUTHOR Sheveland. Dawn E.
TITLE Development of Sheveland Vividness of Imagery Questionnaire in Grades 3-6.
PUB DATE Dec 92
NOTE 16p.; Paper presented at the Annual Meeting of the National Reading Conference (42nd, San Antonio, TX, December 2-5, 1992).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Elementary Education; Elementary School Students; *Evaluation Methods; *Imagery; Reading Research; Test Construction; *Test Reliability; *Test Validity
IDENTIFIERS California (South); Mental Imagery; *Vividness

ABSTRACT

A study investigated the reliability and validity of a measure of imagery vividness appropriate for young children. A questionnaire instrument consisting of 21 Likert-type items was developed and administered to 380 third- through sixth-grade children in a lower-middle to upper-middle socioeconomic population in southern California. Items in the questionnaire were adapted from the "Betts QMI Vividness of Imagery Scale," retaining the original seven sense modalities (visual, auditory, cutaneous, kinesthetic, gustatory, olfactory, and organic). Means, standard deviations, and Pearson intercorrelations among items were calculated as well as other statistics. Results indicated that the instrument evidenced a single construct with seven sense modalities having internal reliability. Development of the instrument seems timely in relation to current research interests related to a more holistic approach to elementary language arts and literacy acquisition. (Six tables of data are included; 28 references, the instrument, and its verbal instructions are attached.) (RS)

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DEVELOPMENT OF SHEVELAND VIVIDNESS OF IMAGERY QUESTIONNAIRE IN GRADES 3-6

As Prepared for the National Reading Conference

San Antonio, Texas

December, 1992

Dawn E. Sheveland
University of California, Riverside
5715 Baltimore Dr. #106
La Mesa, CA 91942

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Introduction

Research on the vividness of imagery as a construct and its correlates date back to the 1800's. It did not gain prominence, however, until the 1970's (White, Sheehan, and Ashton, 1977) and has currently gained wider acceptance with vigorous investigation into issues of validity and reliability (Paivio, 1986, Goetz, Sadoski, Olivarez, 1991). Research in reading has ". . . rapidly expanded beyond its original concern with comprehension, recall, and interpretation. Interest has grown in the areas of constructive, generative, and elaborative forms of reader response such as vivid imagery and emotional reactions so richly experienced in literary encounters" (Goetz, et al., 1991, p. 13).

Methodologies measuring variability in subjects ability to image are presently being developed and explored. The Betts QMI Vividness of Imagery Scale (Sheehan, 1967) has been widely used (White, et al., 1977; Paivio, 1986; Marks, 1973; Long, Winograd and Bridge, 1989; Jampole, Konopak, Readence and Moser, 1991 and others). It was developed by Peter Sheehan from Betts' Questionnaire upon Mental Imagery (1909). It evaluates the vividness of evoked imagery in seven sensory modalities: visual, auditory, cutaneous, kinesthetic, gustatory, olfactory, and organic. Sheehan shortened Betts' scale from 150 items to 35. The seven modalities were retained with seven response categories ranging from "Perfectly clear and as vivid as the actual experience" to "No image present at all, you only 'knowing' that you are thinking of the object." Reliability coefficients of .9 and above have been consistently demonstrated (White, et al., 1977). Mark Sadoski, although not using Sheehan's instrument, has maintained the sense modalities as elements of self report measures of imagery vividness. In a recent investigation concerning issues of reliability and validity in self report imagery measures, Goetz, et al. (1991) reports .9 alpha reliability coefficients in Likert-type ratings of readers' imagery and emotional responses to story paragraphs (p. 14). By statistically controlling for surface-level text factors, convergent - construct validity for these measures was investigated. The results ". . . provide evidence of the convergent construct validity of imagery reports and of imagery and affective response ratings as indices of the reader's experience." (p.22).

There has been increasing interest in imagery vividness and its correlates. Correlates include creative writing (Jampole, et al., 1991), mnemonics, affect, and comprehension in reading (Marks, 1973, Sadoski, 1983, 1985, Sadoski, Goetz and Kangiser, 1988, Sadoski Goetz, Olivarez, Lee, Robert, 1990a, Sadoski, Quast, 1990b, Sadoski, Paivio, Goetz, 1991, Goetz, et al., 1991), effectiveness of instructions (Mayer

and Anderson, 1991), reading pleasure (Nell, 1988) and student interest in reading (Long, et al., 1989). Although reliability and validity have been evidenced by Sheehan, Sadoski and others for measures of imagery vividness, there is a need for a more simple, easily administered, reliable instrument appropriate for younger children. This report is a description of the development of one such instrument for children grades 3-6. It is hypothesized that the instrument will evidence a single construct with seven sense modalities having internal reliability.

Method

A questionnaire instrument consisting of 21 Likert items, each with five possible responses ranging from "Very Clear: Vivid" (4 point) to "No Image, Just Know" (0 point), was administered to 380 children from an elementary school in southern California. The students were from a lower-middle to upper-middle socioeconomic population. The suburban community, although situated close to a major urban area, is adjacent to a rural area with an increasingly dense population. The subjects were 87% Anglo-American, 1% African-American, 4% American Indian, and 7% Hispanic with 1% other ethnic groups. There were 162 boys and 218 girls. Grade levels included 109 third graders, 100 fourth graders, 96 fifth graders and 75 sixth graders.

The items on the questionnaire were adapted from The Betts QMI Vividness of Imagery Scale (Sheehan, 1967) which has demonstrated alpha reliability coefficients of over .9 as well as demonstrating a single dimension in factor analysis (White, et al., 1977). The 35 items from 7 sense modalities were reduced to 21 items, retaining the 7 modalities. Several items were revised for age appropriate understanding and experience (e.g., "A firetruck siren" instead of "The whistle of a locomotive", the elimination of "The warmth of a tepid bath", etc.). Brief elaboration for each item was given verbally by the researcher rather than written instructions. The seven response categories were simplified to 5 (Chi, M.T.& Klahr, D., 1975) and placed beside each item to clarify the response process. The questionnaire was limited to one page rather than 8.

Results

Means, standard deviations, and Pearson intercorrelations among items were calculated (see TABLE 1 and 2) as well as selected statistics related to the overall Cronbach alpha (see TABLE 3).

TABLE 1

Means and Standard Deviations

Sheveland Vividness of Imagery Questionnaire

Item	Mean	Standard Deviation
1	3.37	1.10
2	2.97	1.23
3	3.32	1.13
4	3.24	1.18
5	3.16	1.23
6	2.98	1.33
7	3.01	1.27
8	3.27	1.20
9	2.94	1.40
10	3.32	1.17
11	3.10	1.24
12	2.95	1.39
13	2.98	1.39
14	3.34	1.13
15	2.87	1.36
16	3.42	1.11
17	2.74	1.46
18	2.49	1.54
19	3.54	1.07
20	3.14	1.34
21	3.46	1.12

TABLE 2

Correlation Matrix

Sheveland Vividness of Imagery Questionnaire

	1	2	3	4	5	6	7
1	1.0						
2	.24	1.0					
3	.43	.31	1.0				
4	.25	.28	.32	1.0			
5	.32	.33	.33	.22	1.0		
6	.35	.33	.35	.39	.48	1.0	
7	.21	.33	.26	.31	.25	.31	1.0
8	.23	.19	.13	.24	.25	.32	.40
9	.22	.30	.26	.21	.32	.32	.27
10	.37	.35	.25	.27	.26	.41	.29
11	.22	.33	.36	.34	.34	.40	.32
12	.28	.28	.34	.36	.34	.40	.35
13	.15	.23	.18	.24	.25	.26	.32
14	.27	.20	.23	.21	.30	.32	.30
15	.28	.26	.28	.24	.25	.28	.38
16	.22	.20	.18	.19	.18	.22	.16
17	.19	.25	.17	.16	.22	.29	.25
18	.29	.32	.28	.23	.30	.34	.33
19	.12	.10	.12	.14	.21	.16	.07
20	.20	.16	.19	.22	.29	.23	.19
21	.19	.18	.18	.23	.21	.30	.19

	8	9	10	11	12	13	14
8	1.0						
9	.25	1.0					
10	.29	.22	1.0				
11	.22	.20	.27	1.0			
12	.32	.26	.34	.36	1.0		
13	.32	.36	.23	.20	.21	1.0	
14	.41	.31	.32	.28	.32	.25	1.0
15	.36	.38	.21	.30	.30	.26	.41
16	.17	.15	.17	.11	.16	.15	.25
17	.26	.25	.26	.33	.31	.33	.30
18	.33	.31	.27	.29	.31	.27	.24
19	.12	.29	.11	.14	.15	.21	.22
20	.23	.26	.25	.23	.31	.31	.33
21	.22	.23	.33	.24	.22	.22	.3

	15	16	17	18	19	20	21
15	1.0						
16	.20	1.0					
17	.23	.15	1.0				
18	.33	.18	.34	1.0			
19	.13	.20	.10	.11	1.0		
20	.26	.11	.23	.33	.30	1.0	
21	.21	.16	.23	.27	.20	.34	1.0

TABLE 3

Selected Statistics for

Sheveland Vividness of Imagery Questionnaire

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Corr.	Squared Multiple Corr.	Alpha if Item Deleted
1	62.3	192.4	.46	.31	.88
2	62.7	189.7	.48	.30	.88
3	62.3	191.5	.47	.33	.88
4	62.4	191.0	.46	.28	.88
5	62.4	188.4	.52	.35	.88
6	62.7	184.1	.60	.43	.87
7	62.6	188.1	.51	.34	.87
8	62.4	189.9	.49	.33	.87
9	62.7	186.5	.50	.32	.87
10	62.3	189.9	.50	.33	.87
11	62.5	188.6	.51	.34	.87
12	62.7	184.8	.55	.34	.87
13	62.7	188.1	.46	.28	.88
14	62.3	189.6	.53	.36	.87
15	62.8	186.6	.51	.34	.87
16	62.2	196.5	.31	.14	.88
17	62.9	187.4	.45	.27	.88
18	63.2	183.2	.53	.32	.87
19	62.1	197.8	.29	.19	.88
20	62.5	188.8	.46	.30	.88
21	62.2	192.8	.43	.24	.88

An examination of the correlation matrix (see TABLE 2), the item-total *r*s, and the consistent contribution of all 21 items to the overall Cronbach alpha of .88 (see Table 3), suggests a one factor solution which includes all 21 items. The data were submitted to principal axis factor analysis (PAF with communalities in the diagonals) for an iterated solution. The scree plot (Table 4) and initial statistics (Table 5) also lend support for a one factor solution.

TABLE 4

Scree Plot

Sheveland Vividness of Imagery Questionnaire

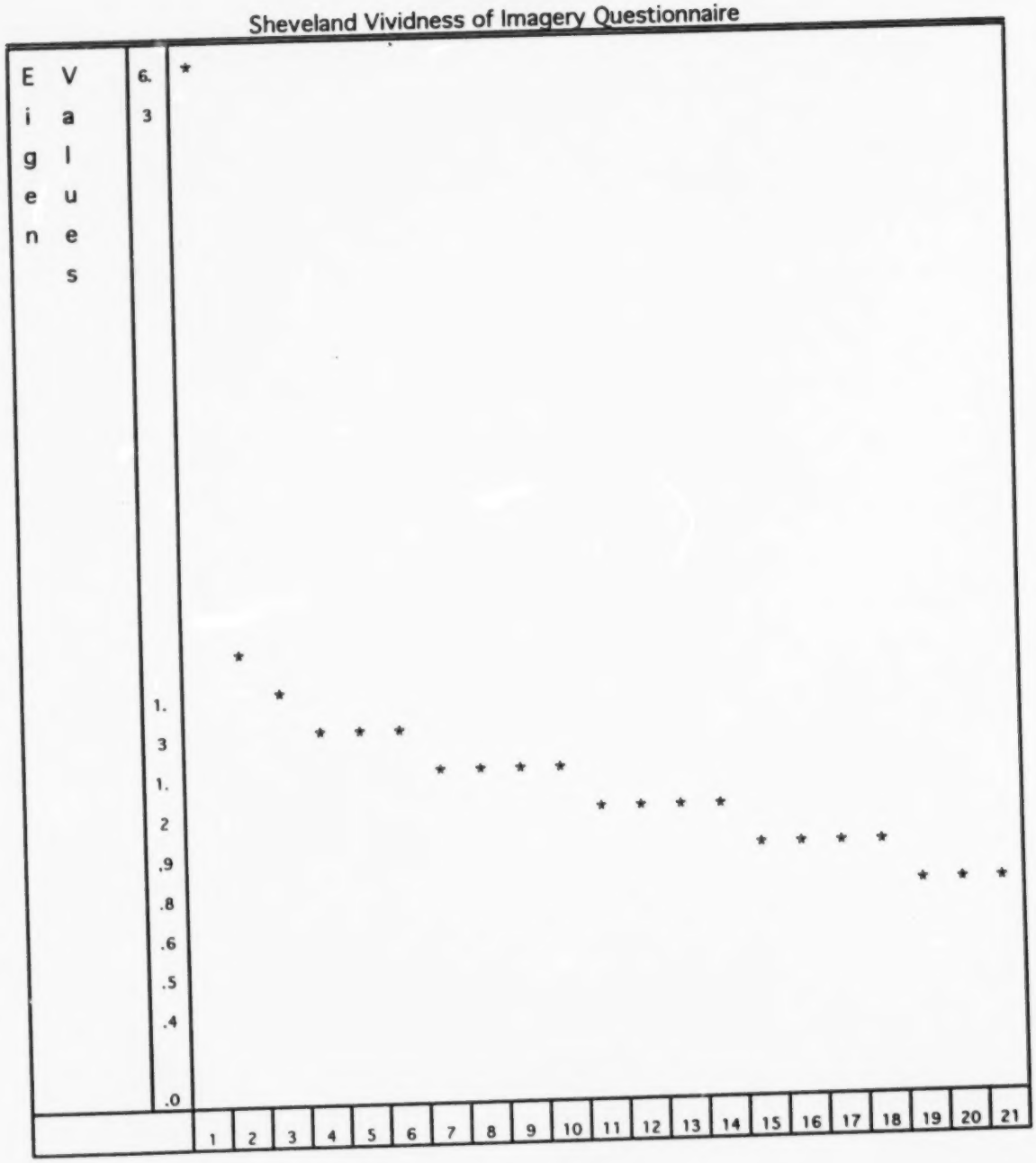

TABLE 5

Factors, Eigenvalues, and Percentage of Variance Accounted For:

Sheveland Vividness of Imagery Questionnaire

Factor	Eigenvalue	% of Variance	Cum. % of Var.
1	6.27	29.9	29.9
2	1.34	6.4	36.2
3	1.17	5.6	41.8
4	1.01	4.8	46.6
5	.99	4.7	51.3
6	.90	4.3	55.6
7	.89	4.2	59.8
8	.82	3.9	63.7
9	.80	3.8	67.6
10	.76	3.6	71.2
11	.73	3.5	74.7
12	.68	3.2	77.9
13	.64	3.0	81.9
14	.62	3.0	83.0
15	.58	2.8	86.7
16	.53	2.5	89.2
17	.51	2.4	91.6
18	.49	2.3	93.9
19	.45	2.1	96.0
20	.42	2.0	98.1
21	.41	1.9	100.0

Factor one accounts for substantially more variance than the other three factors. The scree plot diminishes gradually with no definite bend other than the first three items which account for only 46.6% of the total variance. The factor matrix gives further support for a one factor solution (See TABLE 6).

TABLE 6

Factor Matrix

Sheveland Vividness of Imagery Questionnaire

ITEM	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
1	.50	-.24	.11	-.23
2	.51	-.19	-.05	.19
3	.52	-.34	.12	-.00
4	.50	-.15	.00	.03
5	.56	-.10	.16	.05
6	.65	-.19	.07	-.02
7	.56	-.00	-.36	.07
8	.53	.22	-.30	-.17
9	.52	.17	.09	.16
10	.54	-.09	.00	-.13
11	.55	-.17	-.02	.10
12	.59	-.09	-.04	-.03
13	.49	.26	-.05	.23
14	.58	.24	-.01	-.29
15	.55	.11	-.15	-.06
16	.33	.01	.07	-.10
17	.48	.10	-.09	.11
18	.56	.02	-.07	.09
19	.31	.26	.37	.04
20	.49	.26	.21	.01
21	.46	.13	.14	-.07

All items with the exception of item 19 load onto Factor 1. Item 19 asks for an imaged response to the sensation of hunger. It is hypothesized that the reason this response does not load in an entirely consistent manner with the other items is due to subjects' response to an *actual* feeling rather than an *imaged* response. The other items in the sensation modality (*A sore throat and Sleepiness*) would be less likely actual sensations than *hunger*. *Hunger* might also be more sensitive to the time of day the questionnaire was given. Factor 1 is the second highest loading for item 19 and the inclusion of item 19 does not negatively effect the overall Cronbach alpha reliability coefficient of .88 (see TABLE 3). Therefore, a one factor construct including item 19 appears to be the most parsimonious solution.

Discussion

Current research has demonstrated the importance of interest (Long, et al., 1989), affect (Sadoski, et al., 1990) and pleasure (Nell, 1988) in the reading process. Discrete effects of these personal responses include improved recall, better comprehension (Sadoski, et. al, 1990), and aspects of improved writing skills (Jampole et al., 1991). Vividness of imagery has demonstrated a relationship with both affective and discrete aspects of the reading process. Sheveland Vividness of Imagery Questionnaire was developed on the foundation of past research of self report measures of imagery (White, et al., 1977, Goetz, et al., 1991) and is consistent with prior research which demonstrated there is a single construct with seven sense modalities as well as reliability.

The instrument is timely in relationship to current research interests related to a more holistic approach to elementary language arts and literacy acquisition (Cullinan, 1987, Morrow, 1992, California State Department of Education, 1988). With literature taking a more prominent role, the manner in which students come to understand story is of interest. The processing of narrative text is established early allowing the reader to comprehend, store and retrieve a sense of story. Imagery is a part of this process (Paivio, 1986, Bruner, 1986).

Also linked to imagery is interest. In a study conducted by Long, et al. (1989), reader attitude was found to be significantly related to a combined score for imagery vividness and comprehension (p. 353-356). The contributions of interest and imagery to story knowledge development have practical importance for the educational setting. Wide exposure to narrative over time is recommended, since chunking, automaticity and world knowledge through wide exposure, contribute to a more complex understanding of narrative text (Stein and Glenn, 1979, p. 115, Vygotsky, 1988). Student motivation is important since time in school may not be adequate for such wide exposure. Engagement with text with adequate intrinsic reward becomes a very important factor for the development of independent student reading.

Nell (1988) studied the needs and gratification of reading for pleasure with adult subjects. Some of the findings suggest principles which could apply to children. Reading for pleasure was associated with personal choice in reading material, automaticity of the reading task, imaginarily being lost in the book world, control over the speed of reading, as well as a sense of familiarity with genre form. It also appeared that the avid reader was a result of home socializing factors including modeling, book availability and the association of reading with play. Similar research is needed with elementary children as subjects and the classroom as social context.

Finally, research in the area of reader response relates to imagery. Frameworks for reader response research include such categories as visualizing, imaging, and envisionment (Beach and Hynds, 1991). Langer's (1990) emphasis on categories of envisionment illustrates a wider body of reader response research concerning stance (Galda, 1990, Many, 1991, Garrison and Hynds, 1991). The relationship of such categories to student reading achievement is of present concern and in need of further research.

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Appendix

Name_____
Grade_____
Teacher_____
[ ] Boy [ ] Girl

Sheveland Vividness of Imagery Questionnaire

	Very Clear: Vivid	Moder-ately Clear & Vivid	Not Clear but Recog-nizable	Vague and Dim	No Image Just Know
	4	3	2	1	0
<u>Vision: Your mind's eyes</u>					
1. Your favorite relative's face					
2. The sun setting: sunset					
3. A red apple					
<u>Sound: Your mind's ears</u>					
4. A firetruck siren					
5. The mewing of a cat					
6. The clapping of hands					
<u>Feel: Your mind's hands</u>					
7. Sand					
8. Fur					
9. The prick of a pin					
<u>Action: Your mind's sense of movement</u>					
10. Running upstairs					
11. Drawing a circle on paper					
12. Reaching up to a high shelf					
<u>Taste: Your mind's mouth</u>					
13. Salt					
14. Oranges					
15. Jelly					
<u>Smell: Your mind's nose</u>					
16. Pizza baking					
17. Fresh paint					
18. Freshly mown grass					
<u>Sensations: Your mind's sense of feel</u>					
19. Hunger					
20. A sore throat					
21. Sleepiness					

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Verbal Instructions for
Sheveland Vividness of Imagery Questionnaire

Explain that this is not a test. This is for the purpose of finding out how students think differently from one another. Some people picture things in their mind in a very clear, vivid way while others do not. This does not mean that the way one person thinks is better, it's just different.

This is how the questionnaire works: When I say a word you will check one of the categories beside it. For example, if merry go round were a word on the left, some of you can picture a merry go round so clearly that it is as if you were riding one, your body can feel the motion, you can picture the whole scene. If merry go round were an item on this questionnaire and your image was that vivid, you would check 4--very clear, vivid.

For the next category, 3, some of you might say, I can picture a merry go round clearly in mind, but it is not as if I am actually there, then you would check 3--moderately clear and vivid.

Next, for 2, some of you can picture a merry go round in your mind and it is recognizable as a merry go round but it is not a real clear image, then you would check 2--not clear but recognizable.

For 1, you may have a very vague, dim image of a merry go round, then you would check 1 vague and dim.

The last category, 0, is for you who do not picture a merry go round in your mind, but know what a merry go round is. You can think of a merry go round but do not picture or image one.

Remember, there are no right and wrong answers. I will read each item. Please respond with your first impression. Check only one answer. Do not confer with anyone else.

1. Your favorite relative's face. This could be a mother, father, step dad, sister, uncle. Think of their eyes, nose, mouth. Is your image (read each category) **2. The sun setting: sunset**--Is your image (read each one). **3. A red apple**--Is your image (read each one).

This next category relates to your mind's ear. It works the same way. 4 would mean your mind hears it as if it were actually heard, 3 would mean that the sound is clear but moderately so, 2 it is recognizable, but not clear, 1 it is a vague or dim sound. 0 you are thinking about it but your mind does form an image of the sound. **4. A firetruck siren**--Is your image (read each one). **5. The mewing or meowing of a cat**--Is your image (read each one). **6.** Remember, do not make the noise, think about it. **The clapping of hands.** Is your image (read each one).

The next 3 items relate to your sense of touch. As I read please mark the degree to which your mind can feel. **7. Sand** --Is your image (read each one), **8. Fur, 9. The prick of a pin.** This is like a safety pin, or a needle--something with a sharp tip.

The next 3 relate to your mind's ability to image doing the following actions. Think about doing the acts and the way your mind feels your body doing them. Remember, you do not actually do the actions, but think about it. **10. Running upstairs. 11.** Remember, do not actually do this one but think about **Drawing a circle on paper, 12. Reaching up to a high self**

Next is taste. Your mind's mouth. Mark the degree to which your mind's mouth can taste, **13. Salt, 14. Oranges, 15. Jelly**, this is like peanut butter and jelly. Jelly. Next smell--your mind's nose. With what degree can your mind's nose smell the following? **16. Pizza baking, 17. Fresh paint, 18. Freshly mown grass.** Finally, sensations. To what degree can you feel, **19. Hunger, 20. A sore throat, 21. Sleepiness?**